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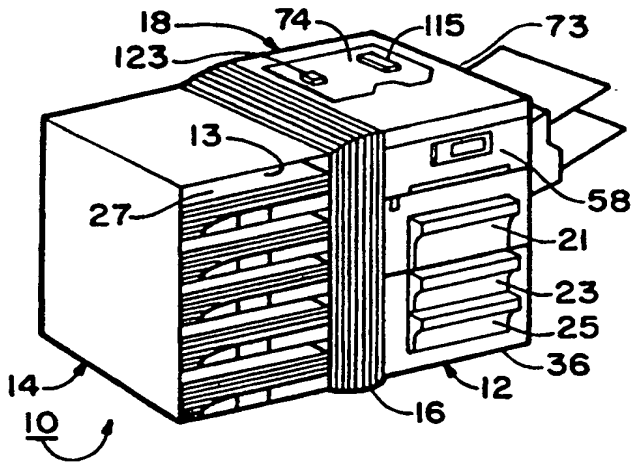
(54) Title: COMPACT PRINTER SYSTEM AND METHOD OF USING SAME

(57) Abstract

A non–impact printer system (10) is disclosed, and includes a paper diverter (18) disposed above the printer for receiving individual sheets of the printed paper seriatim from the printer along a printer path of travel (32) and for positioning the printed sheet temporarily above the printer at a rest position (B). The paper diverter (18) subsequently moves the printed paper sheets sidewardly from the rest position along a transverse paper path (34) at approximately 90 degrees to the printer paper path (32) to a storage position immediately adjacent to the printer to one side thereof to cause the series of printed paper sheets to be moved seriatim at a sharp 90 degree angle from the printer paper path of travel (32) to the storage position. A printed paper sheet storage unit (14) disposed adjacent to the printer at one side thereof at the storage position enables the printer and the sheet storage unit (14) to be closely spaced in a side–by–side configuration.



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TITLE OF THE INVENTION

COMPACT PRINTER SYSTEM AND METHOD OF USING SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable

REFERENCE TO A "MICROFICHE APPENDIX"

Not Applicable

BACKGROUND OF THE INVENTION

Technical Field

The present invention relates in general to a compact printer system and a method of using it. It more particularly relates to a non-impact printer system, which includes a non-impact printer, such as a laser printer, input devices such as paper trays, and output storage units, such as mailboxes and stackers.

Background Art

Modern computer systems employ high speed non-impact printers, such as laser and ink jet printers for printing documents quickly and efficiently. Such modern printer systems are frequently shared by a group of users by employing suitable networks. Thus, such a printer system must perform efficiently and effectively at high rates of speed in order to accommodate the demands of users.

Such systems frequently employ output storage units, such as mailboxes and stackers, since a variety of different documents are being prepared, and a group of different users are creating the documents.

Thus, with such large and sophisticated equipment, the units can occupy large portions of valuable floor space. Additionally, it is desirable to have the units disposed in close proximity to one another in order to be able to use them more conveniently.

A preferred arrangement of the components would be to have the input units or storage trays, the non-impact printer and the output storage unit in a compact

configuration, preferably in a side-by-side configuration so that the overall system components can be positioned against a wall to conserve space, and yet be convenient to use and to operate. Due to the manner in which paper sheets enter and exit these components, it is difficult to arrange the units in a compact configuration.

Conventional laser printers usually discharge printed paper sheets into a stacking compartment on top thereof seriatim. The stacked paper sheets are presented in a portrait mode with the short side of the paper being disposed parallel to the front face of the printer. Conventional storage units, such as mailboxes and stackers ordinarily receive the printed paper sheets in a landscape mode with the longer dimension thereof being the leading edge entering such units. Thus, in order to transport the printed paper sheets being discharged from a non-impact printer in a portrait presentation and then move the sheets into the storage unit disposed at the side of the laser printer in a compact configuration, the paper handling path would require a sharp 90° diverting of the paper from the printer paper path. Such an abrupt change in the paper path is heretofore unknown in the art, in view of the difficulty to change the direction of movement at such an abrupt change of direction without turning the paper sheet.

In U.S. patent 5,188,355, there is disclosed an apparatus for conveying sheets from landscape to portrait in an envelope filling system. The equipment for changing the direction of travel of the paper sheets without rotating the paper include the use of transport rollers disposed at an angle of 45° to cause the paper to gradually change from one direction to another direction at 90° thereto. The gradual changing of direction is required by the patented system due to the high speed of operation to avoid paper jams.

While such an arrangement may be desirable for such an envelope filling system, it would not at all be desirable for use in a non-impact printer arrangement where the printed sheets being discharged from the printer must be moved sidewardly to an immediately adjacent storage unit without jamming.

SUMMARY OF THE INVENTION

The above and further objects of the present invention are realized by providing a new and improved compact non-impact printer system.

Another object of the present invention is to provide such a new and improved printer system which enables paper sheets to be moved from the printer directly sidewardly therefrom in a change of orientation from portrait to landscape without turning the printed paper sheets.

Briefly, the above and further objects of the present invention are realized by providing a new and improved compact printer system, which includes a diverter to move the printed paper sheets from the printer directly sidewardly into an immediately adjacent paper storage unit.

A non-impact printer system is disclosed, and includes a paper diverted disposed above the printer for receiving individual sheets of the printed paper seriatim from the printer along a printer path of travel and for positioning the printed sheet temporarily above the printer at a rest position. The paper diverter subsequently moves the printed paper sheets sidewardly from the rest position along a transverse paper path at approximately 90° to the printer paper path to a storage position immediately adjacent to the printer to one side thereof to cause the series of printed paper sheets to be moved seriatim at a sharp 90° angle from the printer paper path of travel to the storage position. A printed paper sheet storage unit disposed adjacent to the printer at one side thereof at the storage position enables the printer and the sheet storage unit to be closely spaced in a side-by-side configuration.

BRIEF DESCRIPTION OF DRAWINGS

The above mentioned and other objects and features of this invention and the manner of attaining them will become apparent, and the invention itself will be best understood by reference to the following description of the embodiment of the invention in conjunction with the accompanying drawings, wherein:

FIG. 1 is a pictorial view of a compact non-impact printer system, which is constructed in accordance with the present invention;

FIG. 2 is a diagrammatic plan view of the system of FIG. 1;

FIG. 3 is an enlarged, partly diagrammatic, side elevational view of the system of FIG. 1, illustrating the paper flow path into and out of the non-impact printer;

FIG. 4 is an enlarged fragmentary plan view of the system of FIG. 1;

FIG. 5 is an enlarged pictorial view of the paper diverter of FIG. 4, illustrating it with its top lid disposed in its open position;

FIG. 6 is an enlarged sectional fragmentary view of the diverter of FIG. 5 taken substantially on line 6-6 thereof;

FIG. 7 is a diagrammatic plan view of a compact non-impact printer system, which is also constructed in accordance with the present invention;

FIG. 8 is a fragmentary enlarged plan view of the system of FIG. 7;

FIG. 9 is an enlarged pictorial view of the paper diverter of the system of FIG. 7;

FIG. 10 is an enlarged sectional side view of a conveyor belt mechanism of the system of FIG. 8 taken substantially on line 10-10 thereof; and

FIG. 11 is a bottom view of the mechanism of FIG. 10.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring now to the drawings, and more particularly to FIGS. 1-6 thereof, there is shown a non-impact printer system 10, which is constructed in accordance with the present invention. The system 10 is constructed to require very little floor space and be able to be positioned near or against a wall, (not shown) while enabling the users to gain access thereto.

The system 10 generally comprises a non-impact printer unit in the form of a laser printer unit generally indicated at 12. It is to be understood that the system 10 may employ any type of non-impact printer, such as a laser printer or an ink jet printer. The system 10 includes a series of output storage printed paper sheet bins such as the bin 13 in a printed paper sheet storage unit 14. The storage unit 14 may be a mail box unit or a stacker unit. As illustrated and described herein, the storage unit 14 is a mail box unit.

A paper transport 16 conveys the printed paper seriatim from a paper diverter 18 forming a top portion of the laser printer unit 12 for distributing the printed paper sheets to the storage bins, such as the storage bin 13.

The laser printer unit 12 includes a group of paper storage trays, such as the trays 21, 23 and 25 storing stacks of blank paper sheets, such as the respective stacks 22, 24, and 26 (FIG. 3).

Paper sheets are printed within the laser printer unit 12 seriatim at a high rate of speed and are delivered via the paper diverter 18 and the paper transport 16 to one of the bins, such as the bin 13 of the mail box storage unit 14. As an example, a printed paper sheet 27 is the top sheet residing in the bin 13.

Considering now the inventive method of transferring the printed paper sheet 27 from the laser printer unit 12 to the storage bin 13 of the mail box storage unit 14, as best seen in FIG. 2, the printed paper sheet 27 exits a printer mouth 29 in the upper portion of the laser printer unit 12 and moves horizontally rearwardly along a longitudinal printer paper path as generally indicated at 32 from a position A to a rest position B. In this regard, the paper sheet 27 is presented in a portrait orientation and comes to rest at a rest position B.

Thereafter, the diverter 18 causes the printed paper sheet 27 to move from its rest position B leftwardly sidewardly along a sideward transverse paper path indicated generally at 34 in a direction toward and through the paper transport 16 and into the mail box storage unit 14. In accordance with the present invention, the longitudinal printer paper path 32 is disposed at a sharp right angle relative to the sideward transverse paper path 34. In this manner, the storage unit 14 and its paper transport 16 can be mounted compactly in a side-by-side configuration relative to the laser printer unit 12 in accordance with the present invention.

Considering now the laser printer unit 12 in greater detail with reference to FIG. 3, the laser printer unit 12 includes a paper tray housing 36 which is adapted to rest on the floor or other convenient supporting surface, and confines the paper trays 21, 23 and 25. It is to be understood that while three paper trays have been shown

and described, it will become apparent to those skilled in the art that any number of paper trays may be included in the housing 36. For example, two, four or more paper trays may also be employed.

Each one of the paper trays can be removed from the housing 36 for replenishing the supply of blank paper sheets therein. Once disposed in its storage position as indicated in FIG. 3, the paper sheets can be delivered seriatim for printing purposes as hereinafter described in greater detail.

In accordance with the present invention, each paper tray includes a cantilevered feed mechanism 38, 41, and 43 mounted within each one of the respective paper trays 21, 23 and 25 at the open top portions thereof, for ejecting seriatim the top sheet of each one of the stacks 22, 24 and 26 of the paper sheets from the individual trays. In this regard, when the paper trays are removed from the paper printer unit 12, the cantilevered feed mechanisms can be rotated out of blocking engagement with the trays to permit a fresh supply of paper to be positioned within the interior of the tray, and then the cantilevered paper feed mechanisms swing downwardly into position to engage the top sheet of each stack as hereinafter described in greater detail.

Considering now the cantilevered feed mechanisms in greater detail, each one of the mechanisms is similar to one another, and thus only the mechanism 36 will now be described in greater detail. The mechanism 36 includes a cantilevered arm 45 which is pivotally mounted at its rear end portion and between a pair of side walls, such as the side wall 46 of the tray 21. A motor 48 is mounted on the arm 45 and drives a feed roller 49 on the distal free and of the arm 45 to engage top surface of the top sheet 52 of the stack 22 for driving it out of the open top of the tray 21 over a top edge 54 of an angularly sloping end wall 50. In this regard, the end wall 50 is angularly disposed at an obtuse angle relative to the bottom wall 51 to enable the stack 22 to be beveled at an angle as indicated in FIG. 3, so that the top sheet 52 of the stack 22 can be more readily separated from the stack 22 to overcome the frictional engagement with the stack. An angular back stop 53 mounted on the

bottom wall 51 of the tray 21 secures the stack 22 in its beveled condition, whereby the stop 53 extends in a parallel direction relative to the end wall 50. Thus, when the motor 48 is energized, the feed roller 49 drives the top sheet 52 and separates it from the stack 22 so that the sheet 52 is driven along the back end wall 50 and over its top edge 54 to exit the tray 21.

A suitable sheet feed mechanism is disclosed in U.S. patent 5,377,969, which disclosed an articulating or movable pivot point arm. However, the feed arm can have a fixed pivot point, and can be mounted pivotally within the housing instead of the tray. With a fixed pivot point arm, its feed roller is positioned further away from the angular end wall to accommodate a variety of different paper weights.

A vertical paper conveyor 56 transports the blank paper exiting individual ones of the trays 21, 23 and 25 in a vertical direction into a bottom portion of a laser printer housing 58, which is mounted on top of the paper tray housing 36 in a convenient compact manor. A roller 61 mounted within the laser printer housing 58 conveys the blank paper from its vertical path of travel and thence along a horizontal forwardly directed paper path 62 via a roller 63 to a print cartridge 65 to print on the face of the paper sheet. The printed paper sheet is then conveyed to a fuser assembly 67 via a set of feed rollers 69. The paper path then is conveyed in a vertical direction along a vertical paper path 70 at the front portion of the laser printer housing 58 and into a diverter housing 73 having a set of feed rollers 72, which then present the printed paper sheets rearwardly along the horizontal printer paper path 32 and through the printer mouth 29.

Considering now the diverter 18 in greater detail with reference to FIGS. 4, 5 and 6, the diverter 18 includes a hingedly mounted top lid 74, which may be manually moved to its opened position as indicated in FIG. 5 to facilitate the removal of paper jams if any. As best seen in FIG. 5, a guide plate 76 directs the paper sheets, such as the paper sheet 27 onto the top surface of a horizontal diverter platform 79. An upstanding paper guide 78 on the platform 79 receives the long marginal edge of the

printed paper sheet 27 as it moves in the printer paper path 32 toward the rest position B.

A pivotable paper detecting finger 81 pivots out of the plane of the platform 79 as the paper sheet is fed thereover. A switch (not shown) is actuated by the movement of the finger 81 to cause a conveyor belt 83 to be activated for carrying the paper sheet from the guide plate 76 to the paper rest position B along the top surface of the horizontal platform 79. An elongated rectangular opening in the platform 79 receives the conveyor belt 83. The conveyor belt 83 is driven by a motor-driven drive roller 85 and a driven roller 87.

After the paper sheet 27 is conveyed to the rest position B, the paper sheet 27 moves past the finger 81, which then is returned to its upright position. When the spring loaded finger 81 returns to its upright position, the conveyor belt 83 stops its movement to bring the paper sheet 27 to rest at the position B on the platform 79.

In order to move the paper sheet 27 without turning it at right angles thereto along the leftward paper path 34 at a sharp right angle relative to the printer paper path, a pair of conveyor belts 89 and 92 extending at right angles to the conveyor belt 83 carry the paper sheet 27 from the rest position B along the leftward transverse paper path 34 toward the paper transport 16. A pair of elongated spaced-apart parallel rectangular openings 94 and 96 in the platform 79 received the respective conveyor belts 89 and 92, the belts being mounted slightly below the top surface of the platform 79 so that the conveyor belt 83 can transport the paper sheet 27 thereover. For the purpose of engaging and carrying the paper sheet 27 from the rest position B to the position C, each one of the conveyor belts 89 and 92 are provided with a pair of dogs 98 and 101, which are spaced apart by 180° along the endless belt 89. In the position as indicated in FIG. 6, the dog 98 is located at the elongated opening 89 in preparation for moving into position to move the next paper sheet sidewardly. The dog 107 is disposed at the leftward roller 105 after completing the movement of the sheet 27 leftwardly, and is shown in engagement with a pivotal paper clearing finger 109, which when engaged by the dogs, such as the dog 197, is

moved pivotally to actuate a switch (not shown) for de-energizing a motor 112 for the conveyor belt 89 to bring it to a stopped position as indicated in FIG. 6 for awaiting the arrival of the next paper sheet. When the next paper sheet (not shown) arrives at the rest position B, the dog 98 is carried by the belt 89 into a position where it extends through the elongated rectangular opening 94 and extends above the top surface of the platform 79 for engaging the long edge of the paper sheet, together with the corresponding dog 101 of the conveyor belt 92.

Once both of the conveyor belts 89 and 92 are activated in response to the finger 81 indicating the clearing of the paper sheet 27 into its rest position B, the dogs 98 and 101 carry the paper sheet 27 along the paper path 34 toward the position C into the paper transport 16. The paper sheet continues to move to the position C until the dogs 98 and 101 engage their respective paper clearing fingers, such as the finger 109 (FIG. 6). At that point, the conveyor belts 89 and 92 are de-activated.

Considering now the conveyor belt 89 in greater detail with reference to FIG. 6, the conveyor belt 89 is an endless loop and is stretched between the rollers or sprackets 103 and 105. A gear 114 drivingly connects the output shaft of the motor 112 and the drive roller 103.

As best seen in FIG. 1, a housing 115 disposed on top of the lid 74 confines a spring loaded ball 116 (FIG. 5) which is adapted to engage the conveyor belt 83 to guide the paper sheet between the ball 116 and the belt 83 as it moves along the printer paper path 32. Similarly, a pair of spring loaded balls 118 and 120 mounted within the housing 115 of the lid 74 are adapted to engage the respective belts 92 and 89 when the top lid 74 is disposed in its closed position as indicated in FIGS. 1 and 4. Similarly, a roller housing 123 (FIG. 1) at the free end of the top lid 74 confines a floating roller 125 (FIG. 5), which interacts with a roller 127 extending through a rectangular opening 129 of the platform 79 to help carry the paper sheets to the paper transport 16, when the lid 74 is disposed in its closed position.

It will become apparent to those skilled in the art that in place of the endless belts for the conveyor, a series of rollers may also be employed.

Referring now to FIGS. 7, 8, 9, 10 and 11, there is shown another non-impact printer system, 132, which is constructed in accordance with the present invention. The system 132 is similar to the system 10, except that the system 132 can present and/or divert printed paper sheets in four different directions, two of which being moved at a sharp right angle to the printer paper path of travel. Thus, while the system 132 is shown and described to be a non-impact printer system, it may also be employed in a stand-alone kiosk (not shown) for presenting printed documents to customers.

The system 132 generally includes a laser printer unit 133 which is similar to the laser printer unit 12 of FIG. 1. It should be understood that any type of non-impact printer may be used, and thus an ink jet printer (not shown) may also be employed. A paper diverter 134 is mounted in the upper portion of the laser printer unit 133 in a similar manner to the paper diverter of FIG. 1. A paper transport 135 is similar to the paper transport 16 and conveys the printed paper sheets from the paper diverter 134 to a printed paper sheet storage unit 138 in the form of a mailbox. It is understood that other types of output storage units, such as stackers (not shown) may also be employed with the system 132.

With reference to FIG. 7, in use, a printed paper sheet 141 enters the diverter 134 and is moved along a horizontal plane from a printer mouth 142 in a printer paper path 144 direction rearwardly and comes to rest at an initial rest. Thereafter, the paper sheet 141 moves in an opposite direction forwardly longitudinally from the position A into a final rest position B as shown in solid lines in FIG. 7 and in broken lines in FIG. 9.

Once the paper sheet 141 is disposed in the rest position B, it can be presented or delivered leftwardly along a leftward paper path 146 at a sharp right angle to the printer paper path 144 to a position C at the transport 135, which in turn

conveys the paper sheet 141 to a final rest position in the mailbox 138 at a position D.

Alternatively, under computer control, the paper sheet 141 can be moved longitudinally rearwardly along the printer paper path 144 to be presented at a position G. In this regard, when the sheet is presented to the rear of the unit, the sheet does not stop in the rest position A, but instead continues to the position G, where it can be manually taken from the unit.

Alternatively, under computer control, the paper sheet 141 can be moved rightwardly along a rightward paper path 148 to a position F so that it can be presented to a user or customer.

In accordance with the present invention, the diverter 134 can also alternatively move the paper sheet 141 forwardly along the printer paper path 144 to a position H for presenting it from the front portion of the laser printer unit 133 as indicated in FIG. 7. In such a mode of operation, it does not come to rest at the position B, but instead continues to move to the position H. Therefore, the diverter 134 is capable of presenting or delivering paper sheets in any one of four directions selectively, by moving the paper sheet at either a sharp right angle leftwardly or rightwardly transversely, or either forwardly or rearwardly along a longitudinal direction in line with the printer paper path.

Considering now the paper diverter 174 in greater detail, the diverter 174 includes a horizontal diverter platform 153 mounted at the top portion of the laser printer unit 133, and has a hingedly mounted top lid 155, which is hinged to the upper portion of the laser printer unit 133 at 157 (FIG. 9).

In order to control the movement of the paper sheets from the paper diverter, a longitudinal retractable conveyor belt 159 mounted in a rectangular opening 150 in the underside of the lid 155 functions in a similar manner as the conveyor 83 of FIG. 5, for conveying the paper sheet 141 in a longitudinal direction either rearwardly or forwardly. In order to convey the paper sheet 141 either leftwardly or rightwardly in a transverse direction along either the paper path 146 or the paper path 148, a

transverse retractable conveyor belt 162 is mounted within a rectangular opening 163 on the underside of the lid 155. Similarly, a transverse retractable conveyor belt 164 is mounted within a rectangular opening 166 in line with the conveyor belt 164 with the longitudinal conveyor belt 159 disposed therebetween in a T configuration.

A series of longitudinal low friction guides generally indicated at 168 in FIG. 9 on the platform 153 extending transversely to the printer mouth 142 facilitate longitudinal movement of the paper sheet 141. The guides 168 comprise a series of spaced-apart raised elements mounted on the surface of the platform 153, such as a long guide 169 extending adjacent to one side of the mouth 142, and a short guide 170 disposed in axial alignment with the long guide 169 and extending adjacent to the opposite side of the printer mouth 142.

A series of transverse low friction spaced-apart guides 171 such as the guide 173 extend transversely relative to the longitudinal guides 168 for facilitating transverse movement of the paper sheet 141. A set of four rollers generally indicated a 175, such as the roller 177 facilitate transverse movement of the paper sheet 142. A single longitudinal roller 179 disposed in alignment with the row of four transverse rollers 175 is mounted oppositely thereto to facilitate longitudinal movement of the paper sheet 141 along the upper surface of the platform 153.

A pair of low friction plates 182 and 184 (FIG. 9) are mounted on the under surface of the top lid 155 to facilitate movement of the paper sheet 141 between the lid 155 and the platform 153, when the lid 155 is disposed in its closed position as indicated in FIG. 8. Similarly, a hold down tab 186 is cantilevered from the underside of the lid 155 to facilitate the movement of the paper sheet 141 between the lid 155 and the platform 153.

Considering now the printer mount 142 with reference to FIG. 9, the printer mouth 142 is in the form of an elongated slot or opening in the platform 153 and extends transversely thereacross parallel to the leftward and rightward paper paths 146 and 148. An angularly depending guide strip or flange 188 at the rear edge of the slot forming the printer mouth 142 facilitates the movement of the paper sheet

141 from the underside of the platform 153 from the laser printer (not shown) onto the upper surface of the platform 153 to move longitudinally rearwardly along the longitudinal printer paper path 144 until it completely exits the printer mouth 142 and rests at the initial rest position A. A pivotably mounted paper detecting finger 191 at the printer mount 142 intermediate its ends pivots out of the way of the moving paper sheet 142 emerging from below the platform 153 as it is guided up onto the upper surface of the platform 153 and moves rearwardly longitudinally therealong. Once the trailing edge of the paper sheet 144 moves past the finger 191, it pivots to open its switch (not shown) for causing the longitudinal conveyor belt 159 to stop moving. Thus, the sheet 141 then comes to rest at a position A as shown in FIG. 1.

Thereafter, the conveyor belt 159 automatically reverses its direction of travel to move the paper sheet 141 from the initial rest position A forwardly in a longitudinal direction oppositely to the printed paper path direction 144, until the paper sheet 141 comes to rest at the final rest position B. A pivotal paper detecting finger 193 depending from the underside of the lid 155 detects the leading edge of the paper moving forwardly to close a switch (not shown) for stopping longitudinal conveyor belt 159 to cause the paper sheet 141 to come to rest at the position B. Also, the finger 193 causes the longitudinal conveyor belt 159 to retract within the opening 150, unless under computer control, the paper sheet 141 can be presented forwardly from the laser printer unit 133 at the position H. If a forward presentation is desired, the finger 193 pivots, but its switch is overridden to permit the longitudinal conveyor belt 159 to continue conveying the paper sheet 141 forwardly along the paper path 151.

A set of flexible guides or flaps 194, such as the flap 197 disposed along the forward edge of the printer mouth 142 enables the forwardly longitudinally moving paper sheet 141 to move over the mouth 142 without entering it inadvertently.

The conveyor belts 162 and 164 caused the paper sheet 141 to move transversely either leftwardly or rightwardly, once the sheet is disposed in the final rest position B. In order to accomplish either direction of movement, the conveyor

belts 162 and 164 can operate in either direction. Also, it is to be understood that the conveyor belts 162 and 164 remain retracted while the longitudinal conveyor belt 159 is operational. Once it positions the paper sheet 141 in its final rest position B, then the conveyor belt 159 retracts and the conveyor belts 162 and 164 are lowered into position under the force of gravity from the underside of the lid as hereinafter described in greater detail.

Since the three conveyor belts are similarly constructed and operated, only the conveyor belt 164 will now be described in greater detail with reference to FIGS. 10 and 11. The conveyor belt 164 is an endless loop and is mounted for movement between a pair of rollers or sprockets 199 and 102, which are rotatably mounted in a mounting bracket 204 aligned within the opening 166. A pair of aligned elongated openings or slots, such as the opening 206 in the bracket 204 on opposite sides of the roller or sprocket 202 enable the retracting motion of the conveyor belt 164. Similarly, a pair of aligned elongated openings, such as the opening 208 in the bracket 204 on opposite sides of the roller 202 facilitate the retractable operation. As shown in FIGS. 10 and 11, the unit is fully retracted, and thus a pair of axles 210 and 212 for the respective rollers 202 and 199 are disposed in the upper closed ends of the elongated openings. A pair of lever arms 214 and 216 disposed on opposite sides of the belt 164 force and retain the mounting bracket 204 in its retracted position as indicated in the drawings.

A pair of wheels 218 and 222 at the bottom distal ends of the respective lever arms 214 and 216 roll along the bracket 204, and the upper ends of the lever arms are pivotally mounted at 224 and 226. The two lever arms are similar to one another and move in unison about the common pivot axis.

Considering now in greater detail the lever arm 214, it includes a horizontal pin or foot 226 which is controlled by an upstanding pin 228 on a motor driven gear 229 forcibly moves the foot 226 and thus the lever 214 to the bracket retracting vertical position as shown in FIGS. 10 and 11.

In order to retract the conveyor belt 164, the gear 229 moves in a counter clockwise direction as viewed in FIG. 11 through a partial rotation to a position as indicated in broken lines to cause a tension spring 231 to swing the lever arms 214 and 216 into the position as indicated in FIG. 10 whereby the wheels 218 and 222 roll along the mounting bracket as it falls under the force of gravity into its actuated position.

It will become apparent to those skilled in the art that the conveyor belts may be replaced with suitable drive rollers (not shown).

While particular embodiments of the present invention have been disclosed, it is to be understood that various different modifications are possible and are contemplated within the true spirit and scope of the appended claims. There is no intention, therefore, of limitations to the exact abstract or disclosure herein presented.

CLAIMS

What is claimed is:

1. A non-impact printer system, comprising:

a non-impact printer unit for printing onto a series of paper sheets seriatim;

paper diverter means disposed above said printer unit for receiving individual sheets of the printed paper seriatim from said printer along a printer paper path and for positioning the printed sheet temporarily at the top portion of said printer unit at a rest position;

said paper diverter means for moving said printed paper sheet subsequently sidewardly from said rest position along a transverse paper path at 90° relative to the printer paper path to a storage position immediately adjacent to said printer unit to one side thereof to cause the series of printed paper sheets, to be moved seriatim at a sharp 90° angle from the printer paper path to the storage position; and

a printed paper sheet storage unit disposed adjacent to said printer unit at one side thereof at said storage position to enable said printer unit and said sheet storage unit to be closely spaced in a side-by-side configuration.

2. A non-impact printer system according to claim 1, further including means for transporting sheets of paper seriatim to said printer for printing thereon.

3. A non-impact printer system according to claim 1, wherein said paper diverter means moves the printed paper sheets selectively sidewardly seriatim either rightwardly or leftwardly from said rest position.

4. A non-impact printer system according to claim 3, wherein said paper diverter means moves the printed paper sheets selectively longitudinally seriatim from said rest position either rearwardly or forwardly selectively.

5. A non-impact printer system according to claim 1, wherein said printer unit includes paper trays each having a cantilevered paper feed mechanism

mounted therein and having a motor driven feed roller for driving the topmost paper sheet from its paper tray.

6. A non-impact printer system according to claim 5, wherein said paper tray has a sloping end wall and an angular stop for confining the paper stack in a leveled configuration.

7. A paper diverter for conveying paper exiting a printer, comprising:

for receiving individual sheets of the printer paper seriatim from the printer along a printer paper path and for positioning the printed sheet temporarily at a rest position; and

means for moving said printed paper subsequently sidewardly from said rest position along a transverse paper path at 90° to the printer paper path to a storage position immediately adjacent to said diverter to one side thereof to cause the series of printed paper sheets, to be moved seriatim at a sharp 90° angle from the printer paper path to the storage position.

8. A non-impact printer system according to claim 7, further including means for moving the printed paper sheets selectively sidewardly seriatim either rightwardly or leftwardly from said rest position.

9. A non-impact printer system according to claim 7, further including means for moving the printed paper sheets selectively longitudinally seriatim from said rest position.

10. A method of diverting paper sheets from a non-impact printer unit comprising:

receiving individual sheets of the printed paper seriatim from the printer unit along a printer paper path;

positioning the printed sheet temporarily at a rest position; and

moving said printer paper subsequently sidewardly from said rest position along a transverse paper path at approximately 90° to the printer paper path to an adjacent storage position to cause the series of printed paper sheets, to be

moved seriatim at a sharp 90° angle from the printer paper path to the storage position.

11. A method according to claim 10, further including moving the printed paper sheets selectively sidewardly seriatim either rightwardly or leftwardly from said rest position.

12. A method according to claim 11, further including moving the printed paper sheets selectively longitudinally seriatim from said rest position.

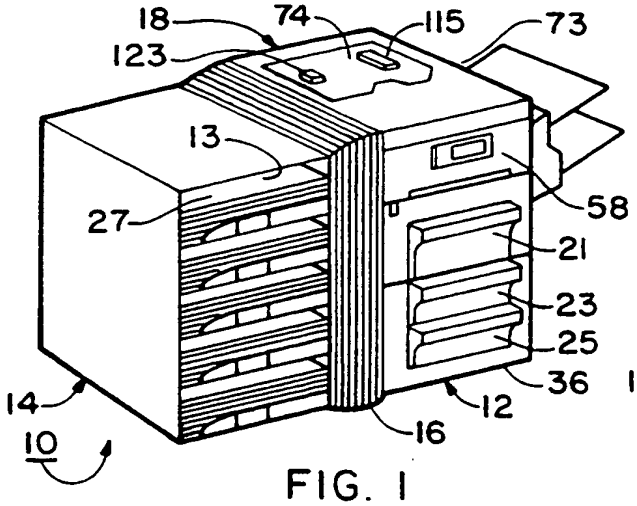

FIG. 1

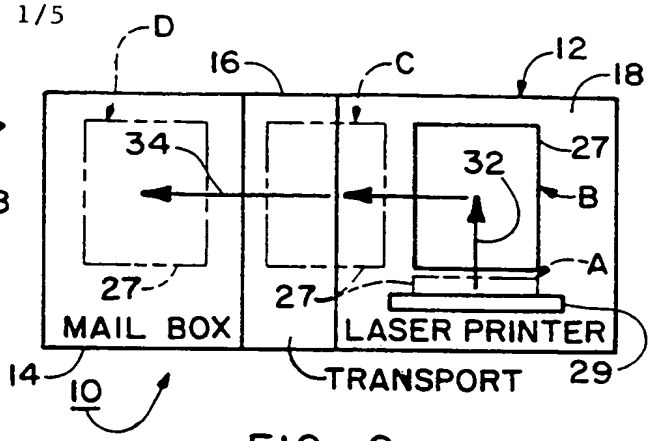

FIG. 2

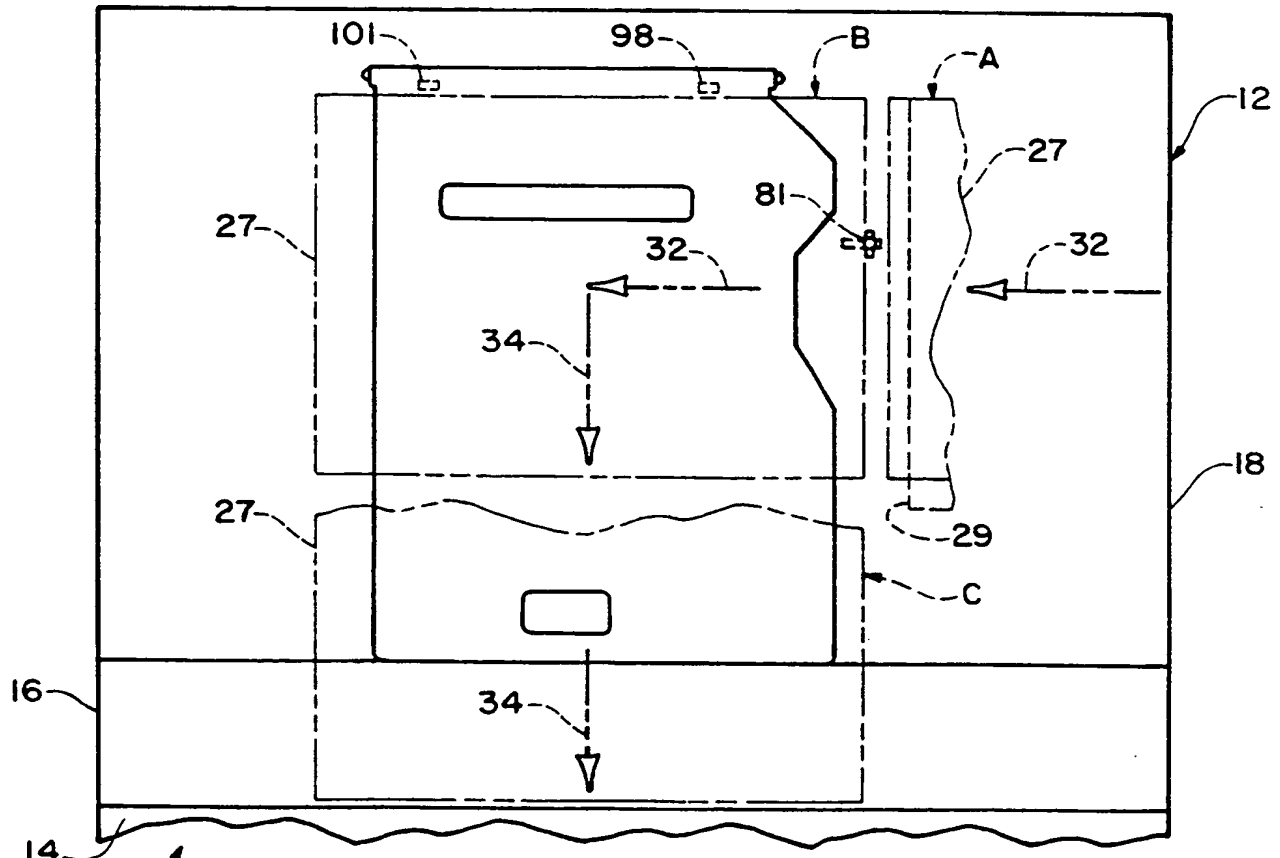

FIG. 4

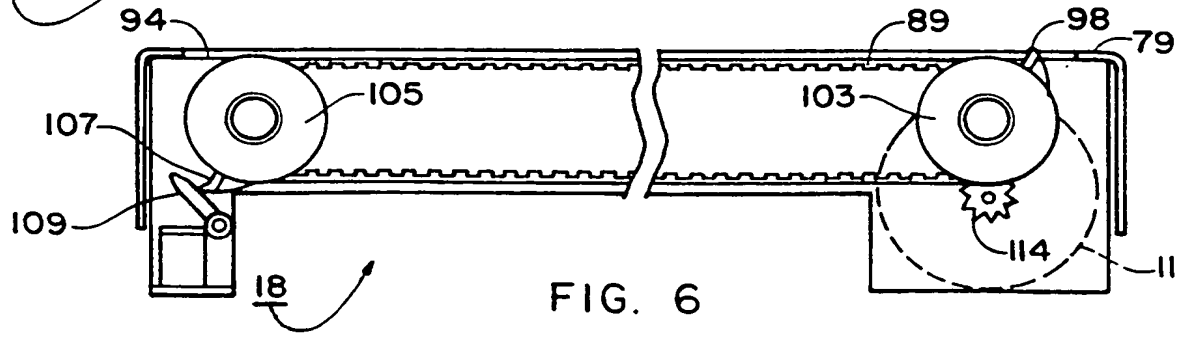

FIG. 6

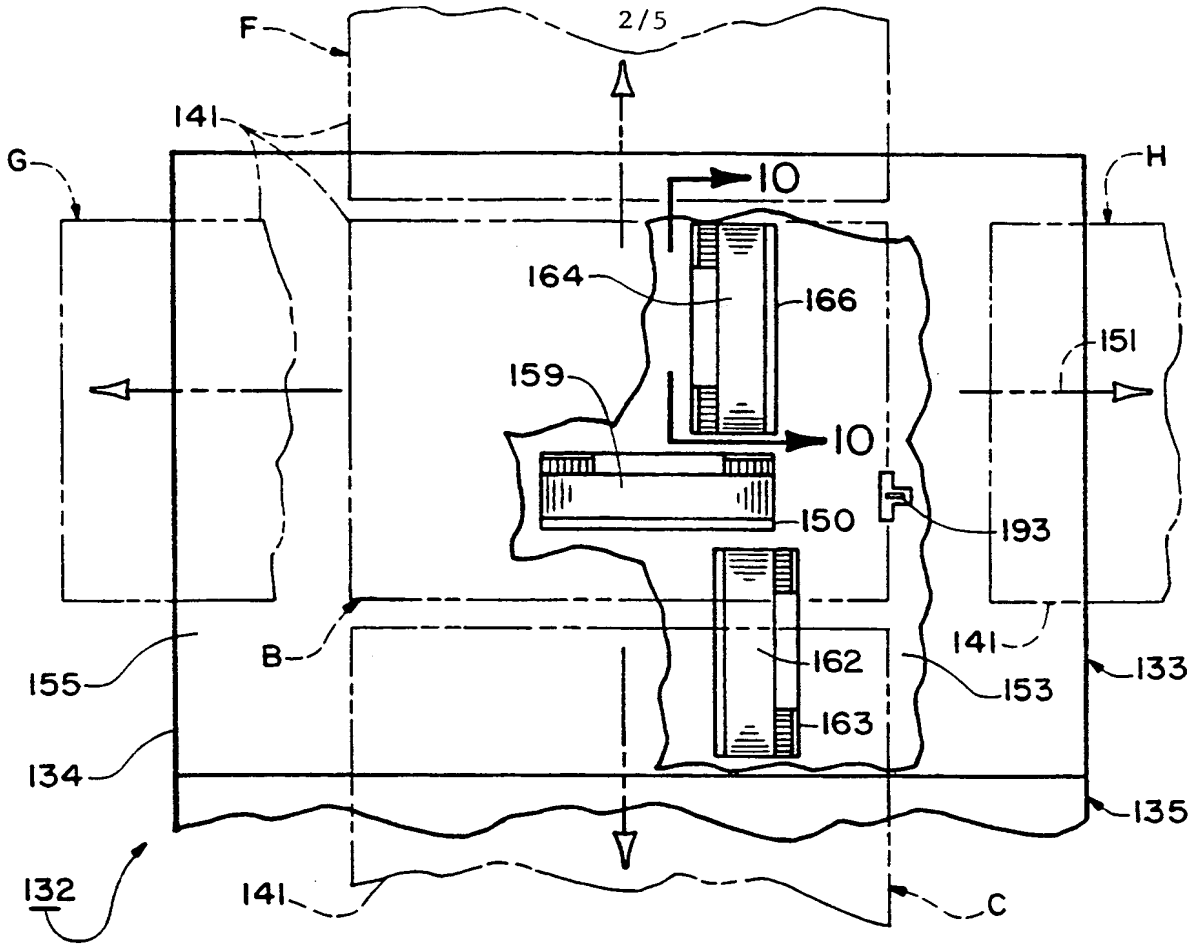

FIG. 8

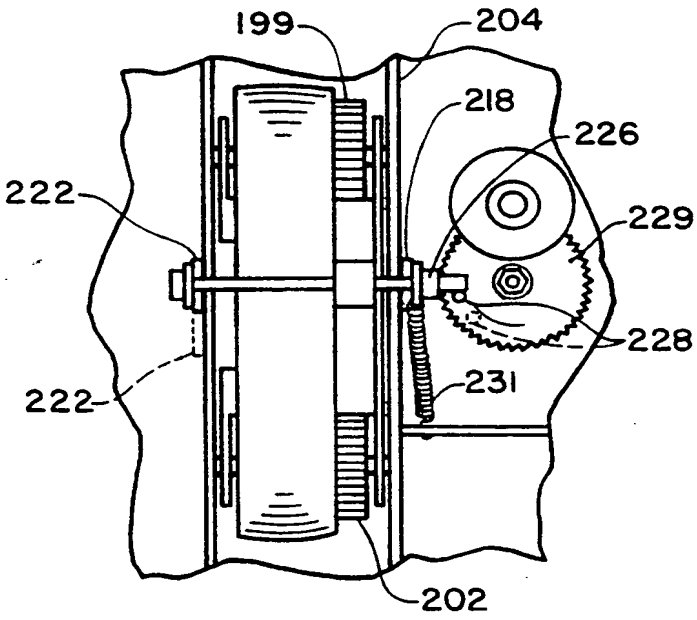

FIG. 11

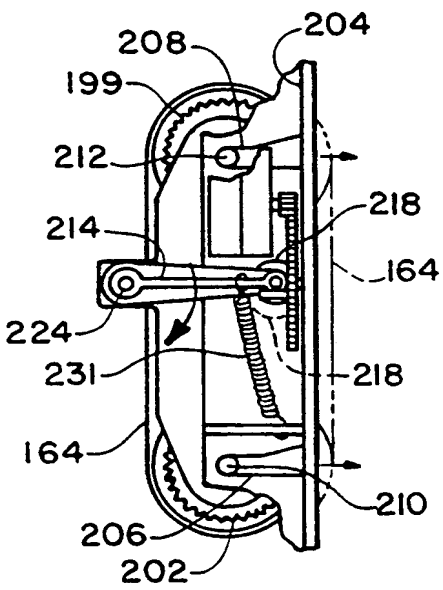

FIG. 10

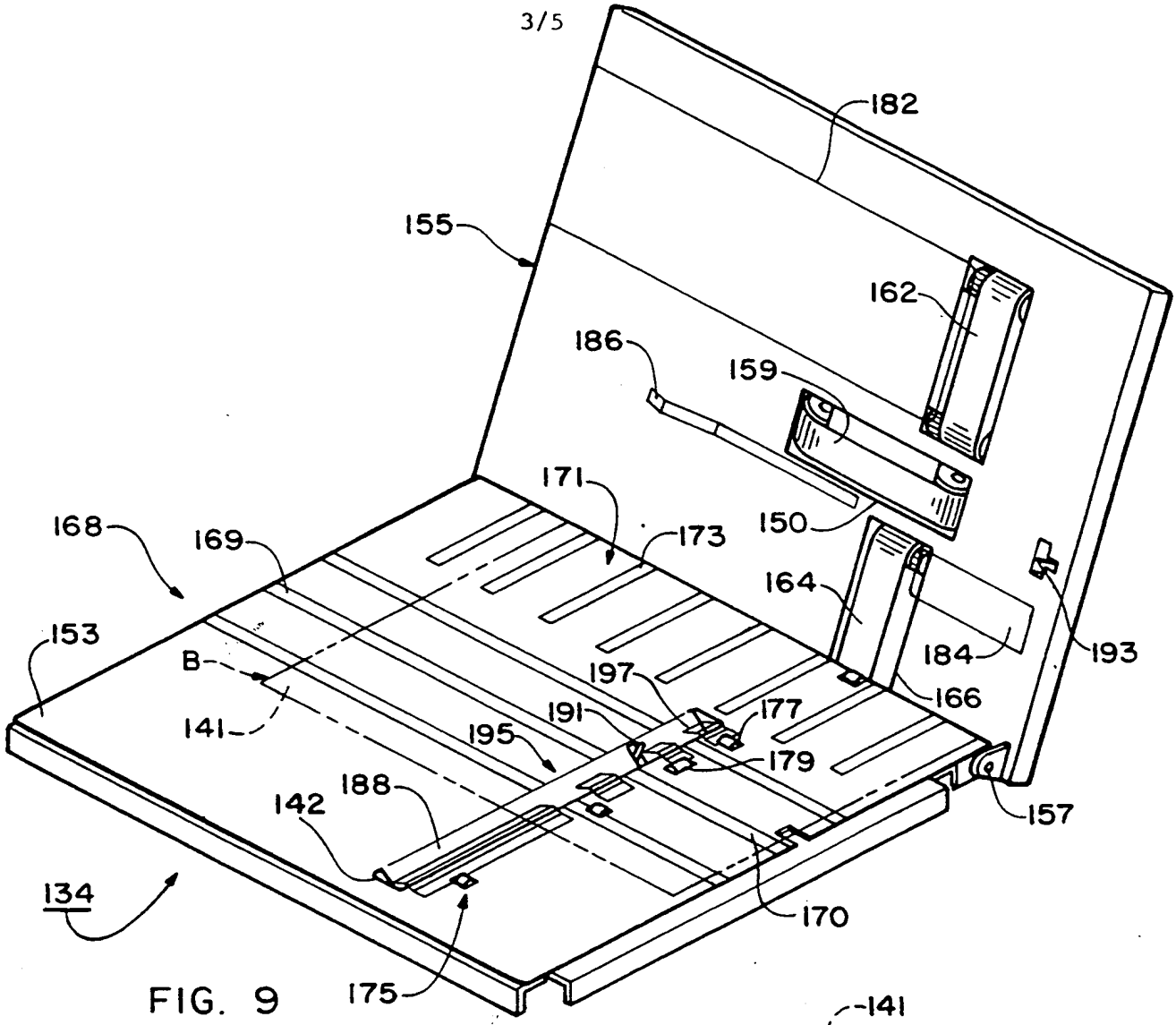
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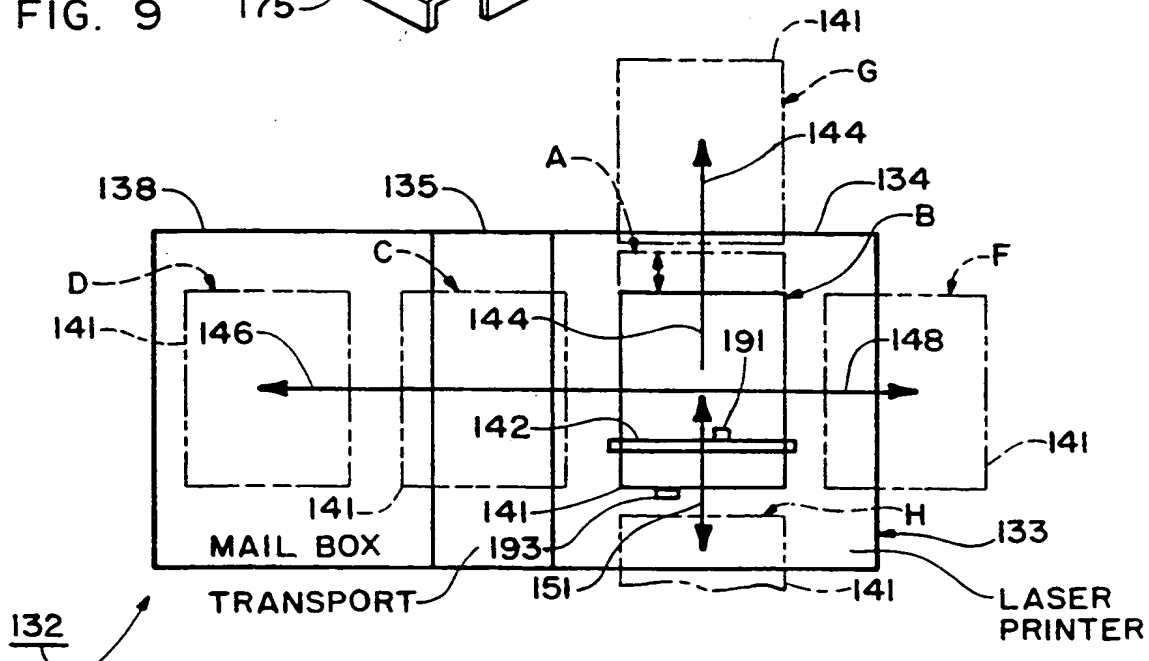
FIG. 9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TRANSPORT
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LASER
PRINTER
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FIG. 7

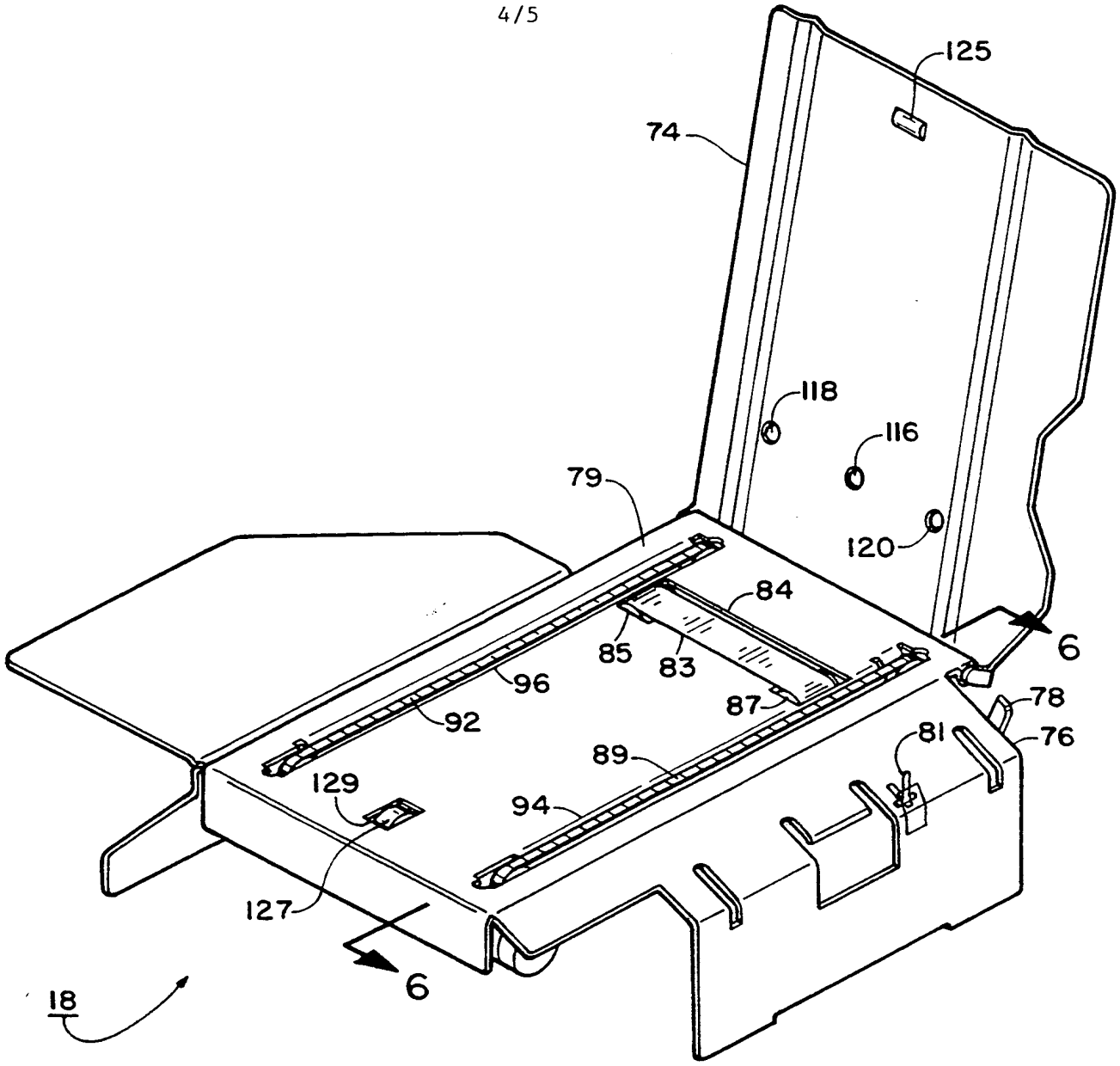

FIG. 5

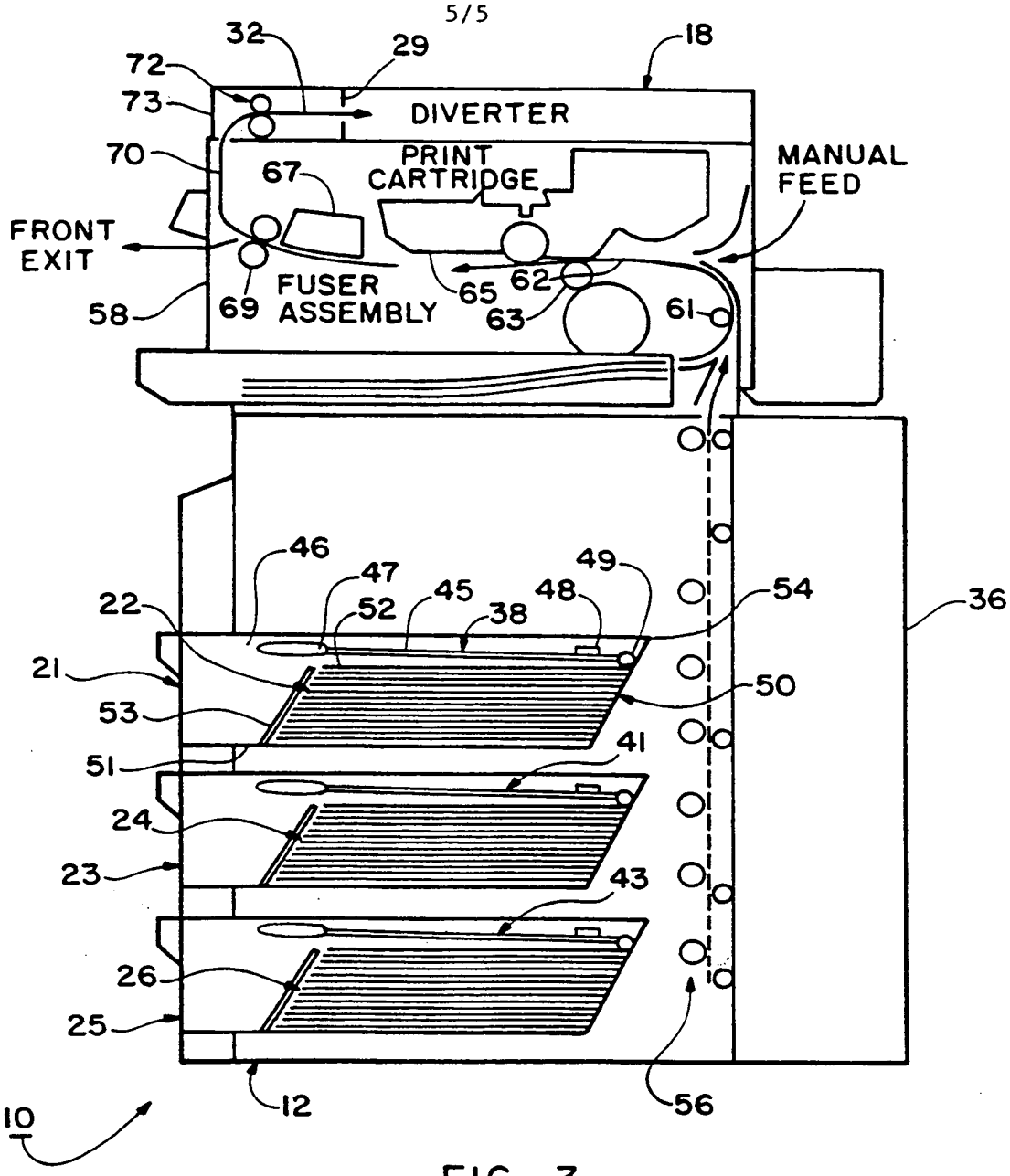
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FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/06602

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :B65H 29/00
US CL :271/184
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 271/184, 3.14, 3.18, 3.19, 9.01, 9.11, 225, 298, 302

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US, A, 5,205,551 (NAGANO et al.) 27 April 1993 (27/04/93), see the entire document.	1-3 and 7-12 --- 5 and 6
X	US, A, 4,733,857 (FELDEISEN et al.) 29 March 1988 (29/03/88), see entire document.	1-3 and 7-12
X	US, A, 5,449,165 (NARAMORE) 12 September 1995 (12/09/95), see the entire document.	1-3 and 7-12
Y	US, A, 5,377,969 (STEINHILBER) 03 January 1995 (03/01/95), see figure 1.	5 and 6
A	US, A, 5,188,355 (LOWELL et al.) 23 February 1993 (23/02/93).	NONE

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
18 AUGUST 1998

Date of mailing of the international search report
28 SEP 1998

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